

**Status and Breeding Activities of the Southwestern Willow Flycatcher  
at the Cleveland National Forest in 1999**

**Final Report**

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## INTRODUCTION

The Southwestern Willow Flycatcher (*Empidonax traillii extimus*) is one of four subspecies of the willow flycatcher in the United States, with a breeding range including southern California, Arizona, New Mexico, extreme southern portions of Nevada and Utah, and western Texas (Hubbard 1987, Unitt 1987). Restricted to riparian habitat for breeding, the southwestern willow flycatcher has declined in recent decades in response to widespread habitat loss throughout its range and, possibly, cowbird parasitism (Wheelock 1912; Willett 1912, 1933; Grinnell and Miller 1944; Unitt 1984, 1987; Gaines 1988; Schlorff 1990; Whitfield and Sogge 1999). By 1993, the species was believed to number approximately 70 pairs in California (USFWS 1993) in small disjunct populations. The southwestern willow flycatcher (hereafter “willow flycatcher”) was listed as endangered by the State of California in 1992 and by the U.S. Fish and Wildlife Service in 1995.

Although they co-occur in southern California with another riparian obligate endangered by habitat loss and cowbird parasitism, the least Bell’s vireo (*Vireo bellii pusillus*), willow flycatchers have failed to increase in the wake of intensive management efforts during the last decade to reduce these threats. Unlike least Bell’s vireos, which have increased nearly six-fold since 1986 to a current statewide population of approximately 1800 males (L. Hays, pers. comm.), willow flycatcher numbers remain low. Currently, the bulk of the California population is concentrated at three sites: the South Fork of the Kern River in Kern County (Whitfield 1999), Marine Corps Base Camp Pendleton in San Diego County (Kus 1996, Griffith and Griffith 1997), and the Upper San Luis Rey River, including a portion of the Cleveland National Forest in San Diego County (Griffith and Griffith 1995, Winter and McKelvey 1999, W. Haas pers. comm.). Outside of these sites, southwestern willow flycatchers occur as small, isolated populations of one to half a dozen pairs (Kus and Beck 1998 (rangeland), Famolaro 1999 (Sweetwater Reservoir), Pike *et al.* 1997 (Santa Ana River), M. Holmgren, pers. comm. (Santa Ynez River), M. Whitfield, pers. comm. (Owens Valley), W. Haas, pers. comm. (San Felipe Creek), Kus *et al.*, in prep. (lower San Luis Rey River)). Data on the distribution and demography of the flycatcher, as well as identification of factors limiting the species, are critical information needs during the current stage of recovery planning.

The purpose of this study was to document the status of a sub-population of southwestern willow flycatchers along the upper San Luis Rey River in the Cleveland National Forest, San Diego County, California. Specifically, our goals were to (1) determine the size and composition of the breeding population of flycatchers, and (2) to document nesting activities as possible within the survey framework. These data, when combined with data for other years, will inform Forest Service managers about the status of this endangered species on their properties, and guide modification of land use and management practices as appropriate to ensure the species’ continued existence.

## STUDY SITE AND METHODS

### A. Study Site

The study area consists of an approximately 2.5-km (1.5-mile) reach of the San Luis Rey River traversing Cleveland National Forest land downstream of Lake Henshaw (Figure 1). The site is bordered upstream by Vista Irrigation District property, and downstream by private property. The flood plain in this reach is narrow, and is bordered by steep slopes supporting chaparral vegetation. Riparian habitat within the study area includes a mix of mature willow woodland and coast live oak woodland. Dominant species include coast live oak (*Quercus agrifolia*), willow (*Salix* spp.), western sycamore (*Platanus racemosa*), Arizona ash (*Fraxinus velutina*), and white alder (*Alnus rhombifolia*). Thick understory vegetation, including wild rose (*Rosa californica*), poison oak (*Toxicodendron diversilobum*), stinging nettle (*Urtica dioica*), and California blackberry (*Rubus ursinus*), is interspersed with patches of open habitat dominated by annual grasses and bracken fern (*Pteridium* sp.). Surface flows are regulated by a dam at Lake Henshaw operated by the Vista Irrigation District, and water is present in the river channel year-round. Spring and summer flows are swift, and slow-moving backwater/marshy habitats are absent.

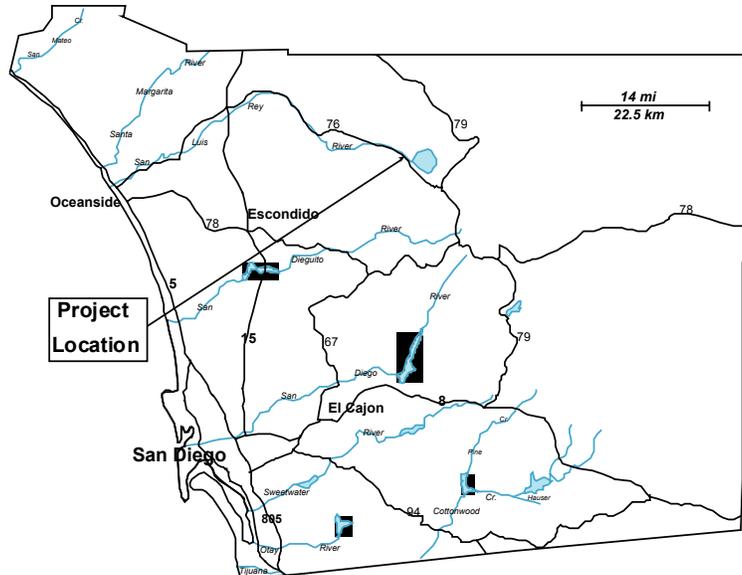


Figure 1. Location of the Cleveland National Forest study area within San Diego County, CA.

## B. Methods

### *Field Surveys*

A total of 12 field surveys were conducted at approximately 10-day intervals between 18 May and 17 August 1999. An additional three visits were made to the site to band nestlings (see below). Fieldwork was performed by J. Wells and P. Beck, with assistance by B. Kus.

Field investigators worked together on the first two surveys to familiarize themselves with the entire study area, and thereafter divided the study area such that each investigator monitored a separate section. Investigators followed standard survey protocol (Sogge *et al.* 1997), moving slowly through the riparian habitat while searching and listening for willow flycatchers. Tapes (playbacks of taped willow flycatcher vocalizations) were not used during the initial survey, and were used only sparingly thereafter to elicit a response from birds not detected after spending 20 minutes in a known territory. A Garmin 38 Global Positioning System (GPS) unit with 15-50 m positioning accuracy was used to determine geographic coordinates of territories for mapping.

For each bird encountered, investigators recorded age (adult or juvenile), sex, breeding status (paired, unpaired or transient), and whether the bird was banded. Pairs were observed for evidence of nesting, and nests located and monitored following standard protocol (Rourke *et al.* 1999) to the extent possible within the 12-visit framework.

Nestlings were banded at 7-10 days of age. Each bird received a single red anodized USGS numbered band on the left leg, consistent with W. Haas (pers. comm.) banding scheme specifying the upper San Luis Rey River as the natal site, and 1999 as the year of fledging.

Characteristics of nests and nest sites were recorded following abandonment or fledging of nests. Data included nest height, widest inside diameter, and depth (lowest rim to bottom of cup, inside); host species, height, and diameter of crown; and distance of the nest from the edge of the host plant, the edge of the host clump, and the river channel. Clump boundaries were defined by gaps in the vegetation whereby foliage (at nest height) in the nest clump did not contact foliage in another clump, such as in thickets of wild rose or blackberry.

Additional activities were conducted in the study area by W. Haas (pers. comm.), who also monitored willow flycatchers upstream and downstream of the Forest Service property in 1999. Activities in the study area were coordinated in an effort to minimize any potential impacts to flycatchers, and information was shared among investigators.

### *Analyses*

Nest success was calculated as the fraction of observed nests that fledged at least one willow flycatcher young. Estimates of productivity (e.g. clutch size, hatch rate, etc.) were derived

from nests observed with eggs, with analyses of average clutch size confined to nests known to contain full clutches. Seasonal patterns of nest initiations are based on the laying date of the first egg, estimating transition dates when necessary based on the following average chronology: nest building: six days, egg laying: number of eggs in the clutch; typically 2-3, incubation: 12 days, nestling: 10-12 days (Rourke et al. 1999).

## RESULTS

### A. Distribution and Composition of Population

A total of 16 male and at least 13 female willow flycatchers were located within the study area (Figure 2, Table 1). An additional two pairs (1B and 15) were detected on the initial survey, but were not monitored further after determining that these birds were outside of USFS property boundaries.

Twelve of the 16 males (75 percent) were paired, and one of these (13) was polygynous, mating with two females in his territory (Table 1). An additional two males (1 and 4) were seen with a second bird in their territories on 1-3 occasions and may have been temporarily paired, but the identity of the second birds as females was not confirmed, and no nesting was observed. Male #3 was determined to be single, and was present from the outset of the study through 25 June, when he was last detected. Male #10B was observed on just one visit on 12 July, and may have moved from another part of the study area or drainage. All of the males with the exception of this latter bird were present in the study area by the date of the first survey, 18 May.

Seven males and three females were returning banded birds, banded in previous years by W. Haas and M. Sogge (B. Haas, pers. comm.). Bill Haas colorbanded additional males and females at the site in 1999. A full analysis of the banding data collected at this site is in preparation by W. Haas.

### B. Nesting Activities

#### *Seasonal Distribution of Nest Initiations*

All of the 12 pairs nested in 1999, producing a total of 21 nests detected in this study (Table 2). An additional nest was reported by W. Haas (Nest "1", Pair 13C). Nesting commenced in early June, and nest initiations peaked during the second half of the month, with 43 percent (9/21) of nests initiated during this two-week period (Figure 3). All but one pair had attempted first nests by the end of June. Pairs continued nest initiations through late July, and fledged young as late as 22 August.

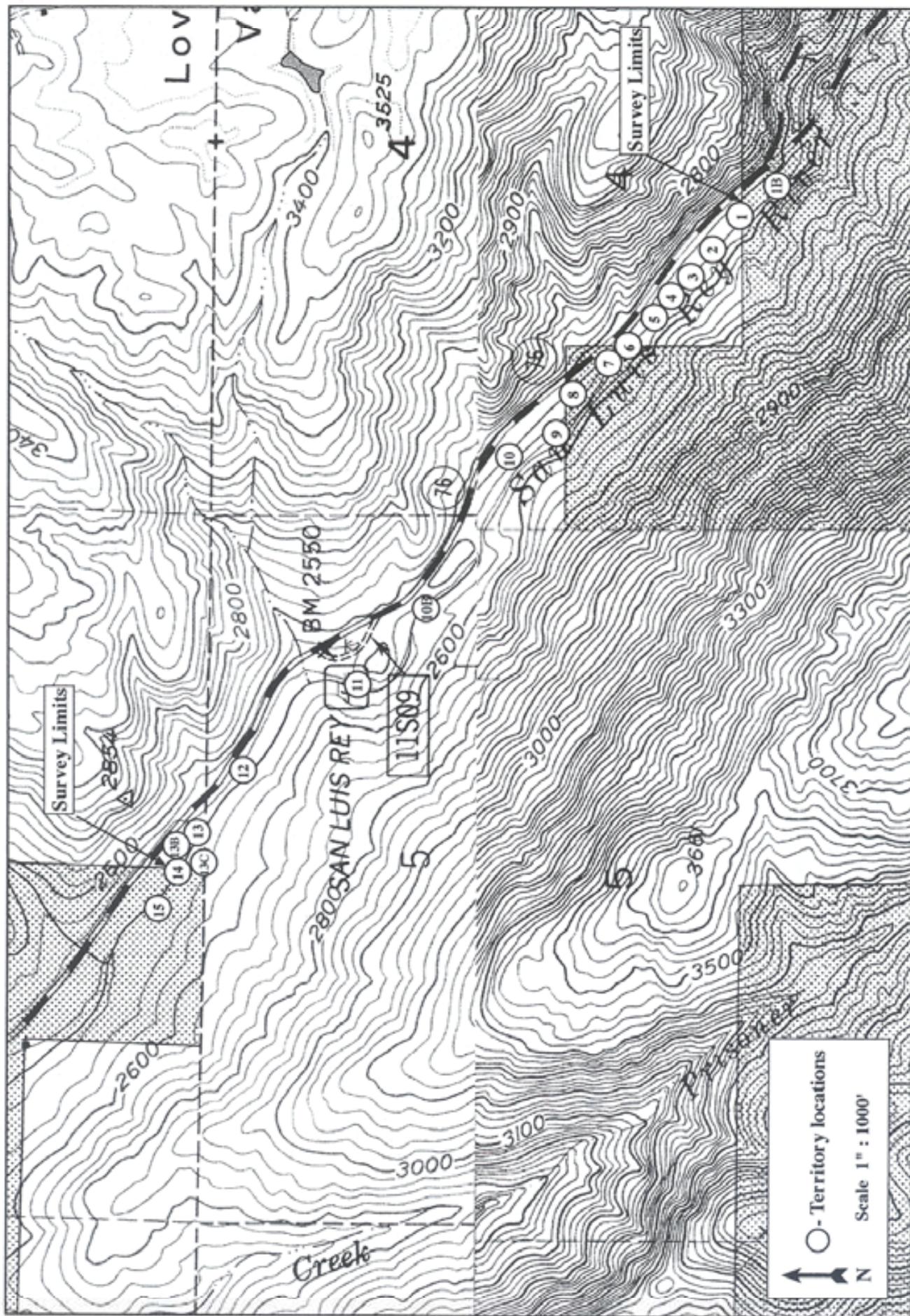


Figure 2. 1999 Southwestern Willow Flycatcher Territory Locations, Cleveland National Forest, San Luis Rey River, CA.

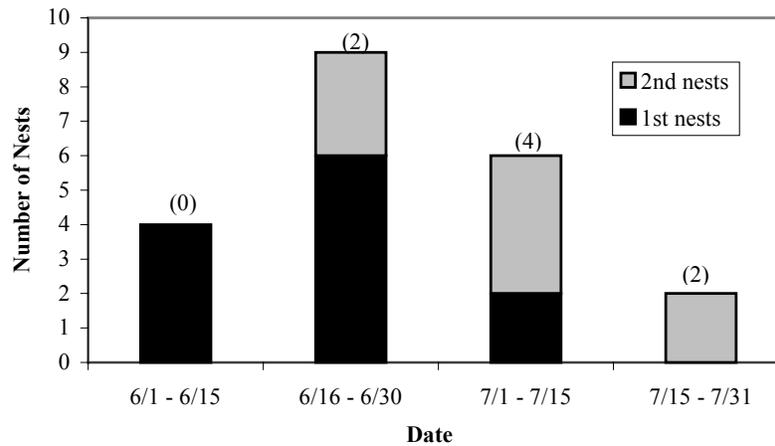
**Table 1.**  
**Southwestern Willow Flycatchers at the Upper San Luis Rey River,**  
**Cleveland National Forest, 1999**

ID Code <sup>1</sup>	Date Male First Detected	Status	Male Banded?	Female Banded?	Comments
1B	5-18	P	?	?	Outside of study area; not monitored.
1	5-18	P?  S	no <sup>2</sup>	NA	Second bird in territory on 3 visits; not confirmed as female. Single after 6/25.
2	5-18	P	no <sup>2</sup>	no	
3	5-18	S	- : m <sup>3</sup>	NA	Not detected after 6/25.
4	5-18	S	? : R	NA	Second bird in territory on 6/25; not confirmed as female. Male last seen 7/12. Right leg is injured; reported to W. Haas.
5	5-18	P	- : m	?	
6	5-18	P	no <sup>2</sup>	no	
7	5-18	P	no <sup>2</sup>	no	
8	5-18	P	R/BWST:R/m	no	
9	5-18	P	R/m:R-Y?	no	
10	5-18	P	no <sup>2</sup>	no	
10B	7-12	S	?	NA	Seen one day. Transient?
11	5-18	P	no <sup>2</sup>	no <sup>2</sup>	
12	5-18	P	P:m/R-Y	no	Male=s left leg/foot injured. Reported to W. Haas, who removed thorn from foot.
13	5-18	P	no	#1 no #2 m : -	Polygynous male with two females in territory.
13C	5-18	P	?	- : m	
14	5-18	P	R/P?:?	R?:m/R?	
15	5-18	P	?	?	Outside of study area; not monitored.

<sup>1</sup>See Figure 2 for territory locations.

<sup>2</sup>Bird subsequently banded by W. Haas.

<sup>3</sup>Band combinations: left leg : right leg; top band/bottom band; A-A = no band, m = USGS metal (silver), R = red, BWST = dark blue-white striped, R-Y = red-yellow split, P = purple.



**Figure 3. Seasonal distribution of southwestern willow flycatcher nests, Cleveland Natl. Forest, 1999. (Numbers in parentheses are number of successful nests).**

### *Nest Success and Productivity*

Eight of the 21 nests (38 percent) fledged young (six nests) or are believed to have fledged young (two nests: Pair 9, nest 1; Pair 13C, nest “2”; Table 2). Of the 13 nest failures, 11 (85 percent) were attributable to predation, one (8 percent) to damage to the nest support plant caused by heavy rain, and one (8 percent) to human disturbance. In the latter instance, the branch supporting the nest was cut with clippers, presumably by a hiker or rafter. All but one of the nest failures (Pair 8, nest 1) occurred during the egg stage. Although Pair 8's nest was too high to observe the contents, observations of the pair feeding nestlings indicated that the nest failed late in the cycle.

Nesting success increased through the season (Figure 3). None of the four nests initiated in early June fledged young; success rate increased to 22 percent of nests during late June, 67 percent in early July, and 100 percent in late July, although the latter is based on a small sample of just two nests.

A total of 36 flycatcher eggs were deposited in 16 nests observed with eggs (Table 2). Clutch size, based on 12 nests seen with full clutches, averaged  $2.58 \pm 0.51$ . Of the 16 nests seen with eggs, seven, or 44 percent, hatched. A similar nest-hatch rate (43 percent) is derived from the number of nests known to hatch (nine; includes two nests seen with nestlings but not eggs) out of the total 21 nests located, with the assumption that all 21 nests contained eggs. Of 36 eggs observed in the 16 nests, 50 percent (18) hatched. Hatching rate in nests that survived until hatching was high, at 95 percent (18 hatchlings/19 eggs); only one infertile or otherwise inviable egg was detected in these nests.

**Table 2.**  
**Nesting Activities of Southwestern Willow Flycatchers at the Upper San Luis Rey River, Cleveland National Forest, 1999.**

Pair ID	Nest Number	Number Eggs	Full Clutch?	Number Nestlings	Number Fledglings	Comments
2	1	?	NA	0	0	Contents not seen before predation. Nest gone.
	2	3	yes	0	0	Predation. Heavy disturbance of vegetation around nest.
5	1	1	no	0	0	Predation. Nest intact.
	2	?	NA	0	0	Nest not completed, or predation early in cycle.
6	1	2	yes	0	0	Predation. Nest slightly disheveled inside.
	2	3	yes	3	3	
7	1	?	NA	0	0	Contents not observable. Predation; nest gone.
	2	2	yes	0	0	Predation. Nest lining pulled out, 2 broken SWFL eggs on ground.
8	1	?	NA	?	0	Contents not observable. No fledglings detected - predation.
	2	3	yes	3	3	
9	1	3	yes	3	3?	Saw nestlings day before fledging, but fledging not confirmed.
10	1	3	yes	0	0	Predation. Nest intact.
	2	3	yes	2	2	One egg did not hatch.
11	1	2	yes	0	0	Predation. Eggshell fragments in nest.
12	1	2	yes	2	2	Banded 2 nestlings.
13 &#1	1	2	?	0	0	Predation.
	2	?	?	2	2	Nest with 2 nestlings located by W. Haas. Banded 2 nestlings.
&#2	1	1	no	0	0	Nest support damaged by heavy rain; female having difficulty incubating. Abandoned w/1 egg.
13C	2?	2	yes	2	2?	W. Haas reports this pair had earlier nest, predated. Fledging of this nest not confirmed.
14	1	1	no	0	0	Human disturbance; nest support branch cut by clippers. Nest gone.
	2	3	yes	3	3	

Twenty fledglings were produced from the 21 monitored nests, yielding a fledging rate of 0.95 young per nest. Although most pairs nested more than once, none double-brooded, and overall seasonal productivity was 1.54 fledglings per female (20/13). Eight of the 13 females (62 percent) contributed young to the population, fledging one or more young.

### ***Parasitism by Brown-headed Cowbirds***

No instances of cowbird parasitism of flycatcher nests were observed in this study.

### **C. Banding**

Four of the eight successful nests were at heights accessible to investigators, and were visited for the purpose of banding nestlings. A total of four young in these nests, two in each of two nests (Pair 12 Nest 1, Pair 13 Nest 2), were colorbanded with a single red anodized band. Young in a third nest (Pair 6 Nest 2) were judged too old to band safely without risking premature fledging, and were not handled. Young in the fourth nest (Pair 14, Nest 2) had already fledged by the date of the banding visit.

### **D. Nest Characteristics**

Flycatchers constructed nests in eight different species of plants, including four trees, and thickets of California rose, stinging nettles, wild grape, and poison oak (Table 3). Half of the nests (10/20) were placed in coast live oak (*Quercus agrifolia*). Nest height ranged from 0.9 to 11 m, and averaged  $3.3 \pm 2.7$  m (N=20). Successful nests were on average lower ( $\bar{X} = 2.7 \pm 1.7$  m, N = 8) than unsuccessful nests ( $\bar{X} = 3.7 \pm 3.2$  m, N = 12), but this difference was not statistically significant ( $t = -0.84$ , 18 df,  $P = 0.41$  (two-tailed)). Distance from nests to the river averaged  $7.9 \pm 11.7$  m (N = 18), and ranged from zero (e.g. nests placed in vegetation over the channel or at the channel's edge) to 40 m.

**Table 3.**  
**Characteristics of Southwestern Willow Flycatcher Nest Sites at the Upper San Luis Rey River, Cleveland National Forest, 1999**

Pair ID	Nest Number	Nest			Species	Host		Distance to (m):		Water
		Hgt. (m)	Diam. (cm)	Depth (cm)		Hgt. (m)	Diam. (m)	Edge of Host	Edge of Clump	
2	1	3.0	-	-	QUE <sup>1</sup>	-	-	0.2	-	-
	2	1.1	5.0	3.0	QUE	3.5	2.5	0.4	0.4	1
5	1	1.3	4.5	3.3	RUB/ FRX	-	-	0.1	1.0	4
6	1	3.2	10.2	3.3	TOX/ RUB	-	-	0.1	0.1	2
	2	1.0	-	-	URT/ RUB	-	-	-	-	3
7	1	9.0	-	-	FRX	-	-	-	-	-
	2	1.7	-	-	QUE	7.0	4.0	0.6	0.6	17
8	1	11.0	-	-	QUE	14.0	6.0	1.5	-	22
	2	3.3	-	-	FRX	7.5	4.0	2.0	2.5	0
9	1	4.1	-	-	QUE	9.0	5.0	0.6	0.6	40
10	1	3.7	-	-	SAL	6.5	2.5	1.0	1.0	0.3
	2	4.0	-	-	QUE	8.0	4.0	0.6	0.6	20
11	1	4.2	-	-	QUE	10.0	6.5	0.5	0.5	0
12	1	1.5	4.9	3.0	QUE	4.0	3.0	0.5	0.5	6
13 ♀#1	1	4.2	-	-	FRX	7.5	3.0	0.3	0.3	1
	2 <sup>2</sup>	1.2	-	-	FRX	7.5	3.0	0.3	0.4	0
♀#2	1	1.1	4.2	2.8	ROS	2.2	0.8	0.7	1.0	0.5
13C	1	5.3	-	-	QUE	12.0	6.0	0.4	0.4	25
14	1	1.0	-	-	QUE	6.0	3.5	-	0.4	0
	2	0.9	5.6	3.8	ALN	14.0	5.0	0.3	0.7	1

<sup>1</sup>Species codes: QUE: *Quercus agrifolia*, RUB: *Rubus ursinus*, FRX: *Fraxinus velutina*, TOX: *Toxicodendron diversilobum*, URT: *Urtica dioica*, SAL: *Salix* sp., ROS: *Rosa californica*, ALN: *Alnus rhombifolia*.  
<sup>2</sup>Nest #2 in same tree as nest #1.

## DISCUSSION

Southwestern willow flycatcher numbers along the upper San Luis Rey River have increased from the 12 territorial males reported by Unitt in 1987 to 40 in 1998 (W. Haas, pers. comm.), coincident with major changes in land use, such as the removal of grazing in the early 1990's, and improved habitat conditions for breeding flycatchers. However, much of this population growth appears to have occurred prior to the mid-1990's, at least within the portion of the population on Forest Service land, where numbers appear to have stabilized since concerted surveys began in 1994. Griffith and Griffith (1995) reported 12 territories within the Forest Service study area in that year, including at least nine pairs. More recent data from 1996 indicate a population of 13 territorial males, 11 of which were paired (W. Haas, pers. comm.). Our observations of 15 territorial males (excluding one transient) and 13 paired females suggest that while this may represent a slight population increase over the last three years, the rate of increase is considerably lower than that that occurred in the late 1980's and early 1990's. Analysis and synthesis of data collected in 1995-98 will shed further light on recent population trends at this site (W. Haas, pers. comm.).

While flycatcher abundance appears to have stabilized at the study site, nest success has declined from 60 percent in 1994 (6/10), calculated from data presented in Griffith and Griffith (1995) and 63 percent in 1996 (10/16; W. Haas, pers. comm.) to 38 percent (8/21) in 1999. 1999 was unusual with regard to the high failure rate of early nests, and the extent to which flycatchers re-nested. Eighty-three percent (10/12) of first nests in 1999 failed, in contrast with 33 percent (3/9) of second nests, and 75 percent of the pairs (9/12) re-nested following unsuccessful initial attempts. In contrast, only two of nine pairs in 1994 (22 percent; Griffith and Griffith 1995), and five of 11 pairs in 1996 (45 percent; W. Haas, pers. comm.), attempted second nests. The factors responsible for the high rate of loss among first nests observed this year are unknown.

Reduced nest success in 1999 resulted in the production of fewer young per nest (0.95) and per female (1.54) than calculated for 1994 (2.1 young per nest, 2.3 young per pair; Griffith and Griffith 1995) and 1996 (1.4 young per nest, 2.0 young per pair; W. Haas, pers. comm.). The decrease in pair productivity observed in 1999 is attributable to low nest success acting in combination with reduced clutch size ( $\bar{X} = 2.6$  eggs/clutch,  $N = 12$ ), which was 27 percent higher in 1994 ( $\bar{X} = 3.3$ ,  $N = 9$ ), a significant difference ( $t = 3.3$ , 19 df,  $P = 0.002$  (one-tailed)). Although most pairs re-nested, and the success rate of second nests was comparable to the overall success rate documented in 1994 and 1996, reduced clutch size lowered the reproductive potential of pairs in 1999 such that they could not achieve the level of productivity observed in previous years. It is noteworthy that the high rate of nest success in 1996 countered the effects of a similarly reduced clutch size that year ( $\bar{X} = 2.7$  eggs/clutch,  $N = 10$ ) such that pair productivity was closer to that observed in 1994.

Hatch rate in nests that survived through hatch date was 95 percent ( $N = 7$  nests); only one infertile or inviable egg was detected in this study. Hatch rate in 1996 was similarly high, at 92

percent (N = 9 nests; W. Haas, pers. comm.).

Although productivity of flycatchers in the Forest Service study area was lower in 1999 than in previous years, it was higher than that at what was formerly the largest concentration of willow flycatchers in California, that along the South Fork of the Kern River (M. Whitfield, pers. comm.). Nest success at the Kern River population in 1999 was 34 percent (10/29), and pairs fledged just 1.3 young per female over the entire season. Moreover, Whitfield reports that hatching rate of eggs in nests that hatched was the second lowest observed since 1989, at 76 percent (N = 17 nests). Hatching rate in the Kern population has fluctuated widely since 1989 when it averaged 94 percent (N = 13 nests), reaching a high in 1994 of 96 percent (N = 16 nests), and a low in 1998 of 73 percent (N = 20 nests). Whitfield attributes the poor productivity to a late start in nesting, moderate predation and parasitism, and the failure of several females to lay viable eggs, or any eggs at all. Data on the performance of other populations in 1999 will be useful in evaluating the extent to which these, and potentially other, factors may have been operating rangewide to depress productivity.

Overall patterns of nest site selection appear similar to previous years. Coast live oaks continue to be the most commonly used nest support.

The loss of a nest to human disturbance, while limited to one instance, is an indication that recreational use of the site is having a minor but measurable effect on willow flycatcher breeding success. Cutting branches to clear trails or passageways by rafters, hikers, and fishermen, as well as trampling of vegetation, are among the activities that warrant future monitoring to assess the extent of human impacts on flycatchers and their habitat at this site. Other aspects of the recreational use of the site, such as the presence of garbage containers and their potential to attract corvids and other nest predators to the area, also bear attention.

The absence of cowbird parasitism in this flycatcher population is an encouraging indication that productivity is not currently being limited by parasitism. Although cowbird trapping was conducted along the upper San Luis Rey River in 1999 (Wells 1999), it is not possible to determine conclusively the extent to which the absence of parasitism can be attributed to the trapping program in the absence of an untrapped "control" site and/or pre-trapping monitoring data documenting rates of parasitism in this population (Winter and McKelvey 1999). Long-term cowbird control at other willow flycatcher breeding sites such as Camp Pendleton and the Kern River, although effective in increasing productivity (Whitfield *et al.* 1999), has failed to produce sustained population increases, and at best may be maintaining stable populations that are limited by factors other than or in addition to parasitism. Evidence that trapping is having a positive effect on the San Luis Rey flycatcher population growth would be useful in evaluating the best use of limited management resources, which should also be applied to identification of other factors limiting flycatchers, and potential means for managing these factors.

It is important to recognize that the sub-population of willow flycatchers on Forest Service

land is part of a larger population, and the extent to which our findings are representative of that larger population remains to be determined. While our study was limited in scope to birds within Forest Service boundaries, it is essential that standardized and comprehensive studies of the entire upper San Luis Rey population be conducted periodically to provide a more ecologically appropriate context within which to address questions regarding flycatcher abundance, nesting success, and demography.

## **CONCLUSION**

With the decline of the Kern River population in 1999 to 23 pairs, the lowest number since the 1980's, the population of willow flycatchers along the upper San Luis Rey River is currently the largest in California. Proper stewardship of this resource on and off Forest Service lands will require careful balancing of sometimes competing activities, including recreation, water management, grazing, urbanization, and habitat protection. Cooperation and coordination among land owners, managers, and regulatory bodies, as well as continued scientific study, will be essential to this process.

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